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President's Page

Obesity and Acute Coronary Syndromes

Stefanos Foussas

Cardiology Department, Tzaneio State Hospital, Piraeus, Greece

In modern times, obesity has become a "pandemic" of global and growing proportions. In the general population, obesity is associated with increased mortality.[1] Obese individuals have a higher incidence of cardiovascular risk factors, such as hypertension, dyslipidemia and diabetes mellitus. Therefore, this group of patients has higher morbidity and mortality associated with diseases of the cardiovascular system. Because weight reduction is associated with an improved cardiovascular risk profile, the guidelines for the primary prevention of cardiovascular disease recommend weight reduction in overweight and obese patients.[2] Despite the limited scientific data, these recommendations have also been expanded to the guidelines for coronary artery disease[3,4] and heart failure.[5]

The effects of obesity on the cardiovascular system are varied and include increased insulin resistance, elevated blood pressure, systemic inflammation and procoagulant state, dyslipidaemia, increased sympathetic activity, heart failure, endothelial dysfunction, coronary artery disease, atrial fibrillation, stroke, and systolic and diastolic dysfunction.[6] Therefore, recent guidelines for the primary prevention of coronary heart disease recommend a reduction in body weight in overweight and obese patients.[6]

In fact, epidemiological data suggest a protective role of obesity against some common diseases. It was first observed that obesity is a favorable prognostic factor in patients with end-stage renal failure.[6] Thus was created the concept of the "obesity paradox". In addition, the "obesity paradox" arose in diseases such as heart failure,[7] atrial fibrillation,[8] sudden cardiac death,[9] and coronary artery disease.[10]

The effect of the "obesity paradox" is also apparent in patients with acute coronary syndromes (ACS). In particular, the MADIT II study found an inverse correlation between body mass index (BMI) and total mortality and sudden cardiac death in patients with systolic dysfunction after acute myocardial infarction (AMI).[7,8]

Moreover, a recent meta-analysis of several studies by Niedjela et al[8] found that both overweight and obese patients had lower mortality after AMI than patients with normal weight; similar results are seen in patients with severe obesity, thus suggesting the possible presence of the "obesity paradox" in coronary artery disease. In the same meta-analysis, overweight patients had 30% lower mortality after ACS compared to patients with a normal BMI; obese patients had 40% lower mortality, and even severely obese subjects (BMI>40 kg/m^2) had 30% lower mortality compared to patients with a normal BMI.

In a study by Herrmann et al,[9] after three years' monitoring, post-AMI patients who were overweight or obese had better outcomes than normal or underweight patients with regard to the overall death rate. The same patients showed no difference in rates of cardiac death according to BMI. We can conclude that the difference in overall mortality between overweight and normal-weight individuals is due more to other comorbidities apart from coronary disease. In the above study, after multivariate analysis, obesity as determined by BMI was not an independent predictor of mortality in patients with ST-elevation myocardial infarction (STEMI).

The SYNERGY trial, which included 9000 patients with non-ST-elevation ACS,[10] found that the annual mortality was greatest in underweight patients, improving with increasing BMI in overweight and obese patients, and levelling off in severely obese patients (BMI>40 kg/m^2), creating the characteristic J-curve of the "obesity paradox".

In addition, a study by Angeras et al confirmed the findings of the preceding meta-analysis that patients who are overweight or obese have better survival compared with lean patients, and that this difference increases as we move further in time from the ACS episode, while there is no evidence that excessively obese patients have lower mortality.[11]

In an analysis by Das et al that included more than 50,000 patients with STEMI, excessively obese patients, even though younger, with less extensive coronary artery disease, less impaired left ventricular systolic performance, and receiving the same quality of therapy, showed greater in-hospital mortality. Furthermore, patients with normal weight had a higher rate of major bleeding.[12]

The main mechanisms of increased mortality in class III obese individuals (BMI>40 kg/m^2) are increased blood volume, increased filling pressures, and increased activation of the sympathetic system. In addition, the proinflammatory and thrombotic state make up an important mechanism of increased mortality in extremely obese patients. Additionally, the increased cardiac mass predisposes to arrhythmias and sudden death, increasing mortality in these patients. At the same time, respiratory complications, such as aspiration pneumonia, sleep apnea, pulmonary thromboembolism, and other hypoventilation syndromes, as well as the prolonged immobility, the difficulty of placing lines, and weight limitations in diagnostic and therapeutic examinations such as angiography, act as catalysts to increase mortality in patients after ACS, according to the study by Das et al.[12] In addition, a study by Wienbergen et al found that obese patients manifest coronary artery disease at a younger age.[13]

Regarding the therapeutic approach to patients with ACS, we see that overweight or obese patients receive a higher rate of treatment with aspirin, angiotensin-converting enzyme inhibitors, beta-blockers, and statins, and are more likely to stop smoking, according to a meta-analysis by Steinberg et al.[14] The same meta-analysis also confirmed that underweight patients were less likely to undergo catheterisation, angioplasty, or coronary artery bypass grafting.

Summarizing the main reasons for the phenomenon of the "obesity paradox" in patients with acute coronary syndrome, overweight or obese patients are younger, have less extensive angiographic coronary artery disease, and usually adopt a more aggressive approach to risk factor modification, while obesity may protect against malignant ventricular arrhythmias during and after AMI. reducing the risk of sudden death.[7]

Possible pathophysiological mechanisms behind the "obesity paradox" include the action of adipose tissue, as the largest endocrine organ, producing hormones (leptin, adiponectin, resistin) with cardioprotective effects after OEM.[15] These effects are probably associated with less arrhythmogenesis and hence reduce the risk of sudden death in patients with ACS.[16] Unlike underweight patients, low levels of adiponectin are found in the obese during the first 4 weeks after AMI; therefore, obese patients have better survival.

The guidelines suggest maintaining an ideal body weight with a BMI of 25 kg/m^2 and a reduction in body weight if BMI>30 kg/m^2 or when waist circumference is >102 cm and >88 cm for women, as weight reduction improves several risk factors related to obesity. Nevertheless, it has not yet been documented that a decrease in body weight *per se* reduces mortality in patients after STEMI.[17] Moreover, the reduction in body weight achieved is usually poor, with weight reduction in obese patients post AMI of only 0.5% and corresponding weight reduction in severely obese patients of 3.5% after one year.[18]

In conclusion, overweight and obese patients appear to have a lower risk of death after the occurrence of an ACS; this is known as the "obesity paradox". Young age, angiography at an earlier stage, and more aggressive treatment of ACS seems to be the aetiology of the "obesity paradox". The data are based mainly on meta-analyses and especially retrospective studies; therefore, prospective randomized studies will be required to further evaluate the effect of obesity in patients with ACS.

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